

BALANUS CRENATUS.

Balanus crenatus, Bruguère, Darwin, *Monogr. Cirripedia, Balanidæ*, p. 261, pl. vi. fig. 6 (1854).

I refer here, but with some hesitation, a small specimen collected in Discovery Bay at 30 fathoms. The shell is regularly and steeply conical, white, the compartments smooth, without longitudinal carinæ, except one, rather obscure, on the carinal valve; the radii are very oblique, the opercular valves much thinner than is usual in *B. crenatus*; the *scutum* has, however, scarcely any trace of an adductor ridge, and the spur of the *tergum* is rounded, but rather longer than in Darwin's figure of that of *B. crenatus*, and placed at rather less than its own width from the horizontal angle. The walls of the shell are internally ribbed. Specimens of *B. porcatus* were collected at the same locality in 20 fathoms.

On a Synthetic Type of Ophiurid from the North Atlantic.

By Prof. P. MARTIN DUNCAN, F.R.S., F.L.S., &c.

[Read December 4, 1879.]

(PLATE III.)

THERE is a very remarkable Ophiuran which forms part of a collection obtained by Dr. Wallich, during his voyage in H.M.S. 'Bulldog' in the year 1860, off the coast of East Greenland. The Ophiuran was presented by him to the Royal Microscopical Society, and I have been permitted to examine and describe it.

At first sight, the little form might be considered to be an Amphiuuran of the *Hemipholis* group, but a glimpse at the upper part of the disk and at the sides of the arms discovers a spinulose condition of the upper surface of the first and a hooked arrangement of the latter structures. The resemblance to species of *Ophiothrix* then becomes more or less striking; but the large scaling of the disk, the absence of the tooth-papillæ, and the presence of accessory pieces around the aboral edge of the upper arm-plates are distinctive characters, which are, to a certain extent, suggestive of Ophiolepian and Ophiopholian affinities. Nevertheless the dental apparatus does not resemble that of these last genera. There is much in the form under consideration which recalls the shape and spinulation of *Ophionyx*, M. & T.; but the absence of tooth-papillæ and the presence of accessory plates to, and

spinules on, the upper arm-plates removes the form from that doubtful genus.

Description.—The length of the specimen is $\frac{3}{10}$ inch, and the body is $\frac{1}{2}$ inch in diameter.

The disk is circular in outline, is swollen inferiorly in the interbrachial spaces, and is slightly tumid on the upper surface.

The radial shields are small, longer than broad, broadest aborally, and they are separated orally by one or two plates. A central rosette of six subequal plates has the central one pentagonal in shape, the others being more or less rounded. Around the rosette is a row of alternately large and small plates; the smaller fit in between the radial shields, and the others cover much of the interrachial spaces, there being only another row reaching to the margin of the disk. A microscopic, transparent, cellular scaling covers the plates of the disk and the spaces between them. There are no long spines to the disk nor accessory scales; but the radial shields are covered with short, broad-based, bulging, conical spinules, terminating in three small glassy thorns. Similar spinules exist on the edges of all the plates of the rosette, and rarely on the minutely scaled derm between them, and also, usually, on the plates which separate each radial shield from its fellow. The spinules increase in number towards the margin of the disk and become crowded there.

Beneath the disk and in the interbrachial spaces the spinules are there abundant, and they are close externally, but rarer near the mouth-shields. A small scaling separates the mouth-shields from the spinulose part, and there are no large plates on the underpart of the disk, which appears to be covered with skin.

The generative slits, two in each space, are large and wide, and reach to the sides of the mouth-shields.

The mouth-shields are small, more or less irregularly lozenge-shaped, broader than long, the aboral edge being broadly curved or produced into a blunt angle, and the oral angle being more acute and less pronounced. The madreporic shield is more rhombic in shape than the others. The side mouth-shields are small, narrow, slightly enlarged at the ends, and the oral margin is slightly concave; they do not quite unite within, and they do not reach far across, below the arm-plate.

The jaws are short and stout, separated slightly, and each angle is widely apart from its neighbours.

There are no true mouth-papillæ, but a small flat spine with a ragged top is situated on the side mouth-shield close to the

jaw; it projects downwards and outwards, and is in relation to the tentacle-opening. The jaws are swollen just externally to the very distinct jaw-plate. The true teeth are five in number, and the lowest is small and knobbed; it aborts in some angles; the next is long, broad and concave orally; and the others are shorter, flat, and slightly rounded where free. There are no tooth-papillæ, neither are there mouth-papillæ on the sides of the jaws.

The first upper arm-plate is small, broader than long, widest and curved distally, and narrower near the disk; it has spinules on it resembling those on the disk. The second plate is larger than the first, is about as broad as long, is broadest distally, the edge being curved outwards. The sides slope in towards the short oral edge, and the whole plate is convex from side to side; it has a few spinules on it in some instances. There are several (five) small accessory plates which are attached to the curved distal edge, and each one carries a spinule. An accessory plate is also on each side of this upper arm-plate near the proximal edge. The third upper arm-plate is longer than broad and is narrowest proximally; the accessory plates are in contact with its distal edge, and there is a knob on each side near the proximal edge, but it is not thorned. Three accessory plates are found in relation to the next plate and to the eighth; they are not fixed on to the edges, for they separate readily. The side knobs are found on these plates also, and usually there is a thorn on each.

The first lower arm-plate is very small, rounded distally, and is prolonged towards the mouth upwards, and it bounds part of the wide space between the jaw-angles; the second is much larger, and is square with a slight re-entering aboral curve; the outer angles are rounded, and the inner are incurved for the passage of the tentacle and the incoming of the side arm-plate. The next plates are longer than broad, are broadest without, have a more or less straight edge distally, and the oral edge is narrow and rounded; far out on the arm they are longer than broad.

The side arm-plates are stout, long, tumid at the sides when seen from above, and the spines project at right angles from them. The plates encroach on the upper arm-plates, but do not meet along the median line. On the lower surface of the arm they form stout processes, which reach nearly, but not quite, to the median line and form much of the surface. They form large flaps on the sides of the arms, and their free and spined distal edge projects outwards beyond the narrow proximal edge of the plate beyond.

The arm-spines are usually four in number, and the upper and lower are the smaller. All are rather short, none being longer than a lower arm-plate, and they are cylindro-conical, constricted at the base and bulging above it, and thence tapering to the end. They are serrate and have large terminal, and occasionally lateral, glassy thorns, and they are striated longitudinally. The lowest spine of the third or fourth side arm-plate has a large thorn on one side, and this is larger on the spine of the next plate; still further out this lateral thorn becomes a curved hook; and at the seventh or eighth plate there is a double transparent claw forming part of a hooked spine; these hooks are large and are continued to the end of the arm.

One tentacle-scale is seen on the arm, and it is large, thin, ragged and spinuled at the free edge, and it is longer than broad. There are no tentacle-scales within the angles of the mouth, and the first is thus absent.

This remarkable Ophiuran came up with the sounding-apparatus from off the sea-floor at a depth of 228 fathoms, about 50 miles north and east of Cape Valloe, East Greenland, and about 200 miles from Cape Farewell, date July 19, 1860, North latitude $60^{\circ} 42'$, longitude $41^{\circ} 42' W$. Dr. Wallich informs me that the "cup" came up full of fragments of granite and felspar, to which were adherent small corallines. Some of them were very delicate, and their perfect condition indicated an undisturbed state of the bottom water where they occurred. There was a sudden decrease of depth close to the spot, and the water shallowed 578 fathoms in three miles.

Although a young form, this specimen presents the normal structures of an Ophiuran, and it is in no way deformed or abortive. The extreme simplicity of the oral apparatus is in itself remarkable: there are true teeth, but the spines on the side mouth-shields are the only mouth-papillæ, and they are so called because it is the fashion, erroneously, so to call all growths from the sides of the jaw-angles and side mouth-shields. The use of the small spines on the side mouth-shields is that of tentacle-scales, and they can have nothing to do with alimentation. This remark holds good in the majority of instances where the spine arises from the jaw, close to the side mouth-shield and tentacle-opening.

There are no tooth-papillæ, and the knob-like projection within the jaw-plate beneath the true teeth, so like that of some Amphiu-rans, is not seen on all the angles. It comes doubtfully, however, within the description of mouth-papillæ, and appears to be a true

tooth. The regularity of the pentagon surrounding the oral apparatus is very striking, and so is the extreme separation of the jaw-angles, much of which, however, may be due to *post mortem* contraction. All the plates on the upper surface of the disk have separate, broad-based, two- or three-thorned, short spinules on their edges and rarely elsewhere, but the spinulation is not distinct between them. The radial shields have the greatest number of spinules on them. All the spines on the side arm-plates project at right angles to the arm, and the hooks are glassy at their top. The combination of Amphiuuran characters and those of *Ophiothrix* is thus remarkable.

Müller and Troschel established the genus *Ophionyx* and gave its diagnosis in their 'System der Asteriden,' 1842. It has the disk furnished with isolated many-thorned spinules, the mouth has only tooth-papillæ, there are two generative openings in each interbrachial space, and the arm is furnished beneath with echinulate spines and hooks. *Ophionyx armata*, M. & T., is delineated by them and *O. scutellum*, Grube, is noticed. This genus can hardly be separated from *Ophiothrix*; and although *Ophionyx armata* is not without the aspects of the form now under consideration, the structural distinctions of the absence of tooth-papillæ and the presence of accessory plates to the upper arm-plates are incompatible with the union of the species under one genus.

The genus *Ophiopholis*, Müll. & Trosch., has the upper arm-plates surrounded by a rim of minute accessory plates, and the lower spine of the under arm-plates is a hook; moreover, the disk is more or less covered with grains or little spines*. There are mouth-papillæ on the sides of the jaw-angles. In *Ophiolipsis*, Müll. & Trosch., the disk has naked plates or scales, there are small accessory scales on the disk and arms, a row surrounding the disk-plates; there are mouth-papillæ, and the arm-spines are arranged along the outer edge of the side arm-plates, and there are usually two tentacle-scales. It is evident, as was suggested at the commencement of this communication, that the alliances of the form are more with these last two genera, but still the distinctness is decided. The extreme simplicity of the dental apparatus, there being no tooth- or mouth-papillæ on the jaw-angles, only a spine on the side mouth-shield or arising from its junction with the jaw, and evidently a tentacle-scale, is remarkable; the true teeth are well developed. The disk is symmetrically plated, spinules

* See Lütken, Addit. ad hist. Ophiurid. p. 11, pl. ii. fig. 16a (1861).

being between and on the plates in small numbers, but no accessory plates exist on it ; beneath, the disk is covered with skin. Spinules are found on the upper part of the arm, and the first and second upper arm-plates are spined. The spines of the side arm-plates project, and there are hooks ; there is one tentacle-scale. These characters distinguish the form, and necessitate its entry into a new genus, *Polypholis*. The species is *Polypholis echinata*.

DESCRIPTION OF PLATE III.

- Fig. 1. The disk and part of the arms from above, magnified.
 2. The disk from below, magnified.
 3. The spinules from the disk, magnified.
 4. The arm spines and hooks, magnified.
 5, *a, b, c*. The tentacle-scale, magnified.
 6. Diagram of the mouth-shield, side mouth-shield, and angle of jaw.
 7. *Polypholis echinata*, nat. size.

On the Hebridal Argentine. By FRANCIS DAY, F.L.S.

[Read March 4, 1880.]

(PLATE IV.)

ARGENTINA SPHYRÆNA.

Sphyræna parva, Rondel. i. p. 227, c. fig. ; Gesner, pp. 883, 1061.
Argentina, Willughby, p. 229 ; Ray, p. 108 ; Artedi, Synon. p. 17, and Genera, p. 8.

Argentina sphyræna, Linn. Syst. Nat. i. p. 518 ; Gmel. Linn. p. 1394 ; Risso, Ichth. Nice, p. 336, and Europ. Mérid. iii. p. 462 ; Cuv. Mém. Mus. i. p. 228, pl. xi. ; Nilsson, Skand. Fauna, Fisk. p. 476 ; Günther, Catal. vi. p. 203 ; Collett, Norges Fiske, p. 171.

Argentina silus, jun., Nilss. Obs. Ichth. 1835, pp. 3-7.

Osmerus hebridicus, Yarrell, Supp. Brit. Fishes, and ed. 2, ii. p. 133 ; Rudd, Zoologist, 1852, p. 3504 ; White, Catal. Brit. Fish. p. 79.

Argentina Cuvieri and *Yarrelli*, Cuv. & Val. xxi. pp. 413, 418.

Argentina hebridica, Nilss. Skand. Faun., Fisk. p. 474 ; Yarrell, Brit. Fishes (ed. 3), i. p. 300 ; Günther, Catal. vi. p. 203.

Hebridal Smelt, Couch, Fishes of the British Isles, iv. p. 297.

Argentina decagon, Clarke, Trans. & Proc. New Zealand Institute, 1878, xi. p. 296, pl. xiv. f. 2.

Stromsild, Christiania.

B. vi. D. 10 ($\frac{2}{5}$). P. 14. V. 11. A. 12 ($\frac{3}{9}$). C. 19. L. 1. 52.
 L. tr. $\frac{3}{4}$. Cæc. pylor. 5.

